Canadian Forces training and mental preparation for adversity:

Empirical review of Stoltz 'Adversity Quotient (AQ) training for optimal response to adversity', a review of the AQ literature and supporting studies

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Abstract

This report reviews the theory of the Adversity Quotient (AQ), and the associated training procedure developed by Stoltz (1997; 2000). This report covers three general areas. First, we present an overview of the AQ conceptual framework and training program. Second, the psychometric properties of the AQ are reviewed to determine if the proposed conceptual framework is supported quantitatively. Third, we critically review the current empirical literature associated with AQ. We also discuss the applicability of the AQ training procedure to the CF, in particular, the utility of current AQ training as a treatment for post-traumatic stress disorder (PTSD), learned helplessness, and to augment leadership training in a military context. Finally, we provide recommendations for the CF with regards to the proposed implementation of the AQ training as a proactive intervention. A critical review of the AQ and associated literature revealed that AQ is based on a number of sound theories implicated in psychological resiliency. However, while the AQ framework and training program may possess face validity in an industrial/organizational context, to date there is lack of empirical literature substantiating both the validity of the AQ framework and the training program in important ways. Thus, the implementation of current AQ training into a military environment must be approached with great prudence. It is recommended that all training materials require significant modification to be applicable to a military context, and that any implementation of a modified training program in the CF be accompanied by rigorous and independent program evaluation.

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Résumé

Ce rapport examine la théorie du quotient d'adversité (QA) et le processus visant à développer ce dernier qui ont été mis au point par Stoltz (1997, 2000). Il comporte trois sections générales. Premièrement, nous présentons un aperçu du cadre théorique et du programme de développement du QA. Deuxièmement, nous examinons les propriétés psychométriques du QA dans le but de déterminer si le cadre théorique proposé est appuyé par des données quantitatives. Troisièmement, nous faisons la critique d'ouvrages empiriques traitant du QA. Nous discutons aussi de l'applicabilité du processus de développement du QA dans les FC et, en particulier, de son utilité dans sa forme actuelle pour traiter le syndrome de stress post-traumatique (SSPT) et l'incapacité apprise, ainsi qu'augmenter le leadership dans les Forces canadiennes. Enfin, nous faisons des recommandations aux FC sur la mise en œuvre du processus de développement du QA comme mesure proactive. Un examen critique des ouvrages liés au QA et à d'autres sujets connexes a montré que le concept du QA est fondé sur un certain nombre de théories sensées sur la résilience. Cependant, même si le cadre théorique et le programme de développement du QA pourraient être valides dans un contexte industriel/organisationnel, on constate pour l'instant l'absence d'ouvrages empiriques qui en soutiennent de façon importante la validité. Ainsi, la mise en œuvre du processus actuel de développement du QA des militaires doit être considérée avec circonspection. On recommande que tout le matériel de formation soit considérablement modifié afin d'être applicable à un contexte militaire et que la mise en œuvre dans les FC de tout programme de développement modifié soit accompagnée d'une évaluation de programme rigoureuse et indépendante.

Executive summary

The purpose of this report is to review and evaluate the empirical foundations of Adversity Quotient (AQ) and to provide the Canadian Forces Leadership Institute (CFLI) with recommendations concerning the appropriateness of the AQ training, in particular with respect to its relevance to the treatment and prevention of Post-Traumatic Stress Disorder (PTSD), and military leadership training.

We begin by briefly reviewing psychological stress and coping issues within a military context. We next outline the major concepts of AQ and discuss whether the AQ framework builds on previous theories and research in the area. The psychometric properties of the Adversity Response Profile (the measure of an individuals' adversity quotient) are then evaluated.

Examples of AQ research, presented on the *Peak Learning Inc.* website, and published in peer-reviewed journals are reviewed. We also discuss the applicability of the AQ conceptual framework and training program to a military context. Based upon this review and evaluation, we offer recommendations for the CF with regards to the implementation of current AQ training. An annotated bibliography also has been included as an appendix to provide a concise review of available AQ literature.

Our review of the AQ literature to date has led to the following findings concerning the AQ conceptual framework, the adjunct training program, and the applicability of AQ to the CF.

AQ/ARP advantages:

- The AQ framework is intended to be applicable to all forms of stress;
- The ARP is intended to assess an individual's ability to respond to all adversities;
- AQ levels are hypothesized to be amenable to change, via implementing the LEAD sequence outlined in the AQ training program;
- The AQ framework is based on the social cognitive literature detailing the role of attributions in psychological stress resiliency;
- The concepts and level of language used in the ARP measure and the AQ training program literature is easily understandable;
- AQ demonstrates some association with industrial/organizational performance outcomes including: income, sales, and performance.

AQ/ARP disadvantages:

- It has not been demonstrated if the AQ construct is better represented through already existing constructs (e.g., hardiness, dispositional optimism, the Attributional Style Questionnaire, etc.);
- The mechanism(s) through which AQ training may enact change remains unclear;
- The AQ hypothesized four-factor structure lacks empirical support via exploratory or confirmatory factor analyses;
- Important aspects of the reliability and validity of the ARP have not been detailed and/or demonstrated;
- AQ proponents have utilized statistical procedures to demonstrate the measure's psychometric properties, which are inadequate or inappropriate. Much of the current AQ research lacks sufficient information to formulate robust conclusions. The characteristics of the samples, procedures, and data of these studies are rarely reported in their entirety;
- Several of the claims listed in the AQ literature have not been empirically substantiated;
- There is a lack of AQ research published in peer-reviewed scientific journals;
- The AQ literature suggests that a wide variety of solutions are obtainable through AQ training. While there is some evidence of research into the nature of AQ assessment, there is only one reported study conducted on the training and its outcomes. Unfortunately, because the test developers did not report any test-retest reliability coefficients, the magnitude and stability of the training outcomes need to be questioned;
- There have been no studies reported on the applicability of current AQ training to military contexts.

Conclusions: Based upon this review, the application of the resilience training program conceptualized in the present AQ framework and training literature should be postponed within the CF. Although psychological resiliency and leadership are important and valid concerns within the CF, to date there is lack of empirical literature substantiating both the validity of the AQ framework and the training program. Thus, at present, it is unclear if the AQ training program can adequately address these issues with methods that are appropriate for military personnel. Any implementation of current AQ training into a military environment must be approached with great prudence. It is recommended that all training materials require significant modification to be applicable to a military context and that any implementation of a modified training program in the CF be accompanied by rigorous and independent program evaluation.

Angelopoulos, P. A., Houde, S. J. R. J., Thompson, M. M., McCreary, D., Blais, A. R., & Pastò, L. 2002. Canadian Forces training and mental preparation for adversity: Empirical review of Stoltz 'Adversity Quotient (AQ) training for optimal response to adversity', a review of the AQ literature and supporting studies. DRDC Toronto TR 2002-147.

Sommaire

Ce rapport vise à examiner et à évaluer les fondements empiriques du quotient d'adversité (QA) ainsi qu'à fournir à l'Institut de leadership des Forces canadiennes des recommandations sur la pertinence du développement du QA, particulièrement en ce qui a trait à la prévention et au traitement du syndrome de stress post-traumatique (SSPT) et à la formation en matière de leadership militaire.

Le rapport commence par un bref examen du stress psychologique et des difficultés éprouvés dans un contexte militaire. Nous faisons ensuite ressortir les grands concepts associés au QA et examinons si son cadre théorique se fonde sur des théories et des recherches déjà effectuées dans le domaine. Nous évaluons ensuite les propriétés psychométriques du profil de réaction à l'adversité [*Adversity Response Profile* (ARP)], qui sert à mesurer le QA.
Vient ensuite un examen des exemples de recherches relatives au QA, présentées sur le site Web de *Peak Learning Inc.* et publiées dans des revues scientifiques dotées d'un comité de lecture. Nous nous penchons aussi sur la question de l'applicabilité du cadre théorique et du processus de développement du QA dans un contexte militaire. En nous fondant sur les résultats de ces examens et de ces évaluations, nous formulons des recommandations à l'intention des FC sur la mise en œuvre du processus de développement du QA tel qu'il est actuellement. Une bibliographie analytique figure également en annexe afin de donner un aperçu des ouvrages disponibles sur la question.

Jusqu'à maintenant, notre examen des ouvrages traitant du QA nous a permis de faire les observations suivantes au sujet du cadre théorique et du programme de développement du QA ainsi que de son applicabilité au sein des FC.

Avantages du QA/ARP :

- Le cadre théorique du QA est censé être applicable à toutes les formes de stress;
- L'ARP est censé évaluer la capacité d'une personne à réagir à toutes les épreuves;
- On estime qu'il est facile d'augmenter son QA en mettant en pratique les quatre étapes (*LEAD*) exposées dans le programme de développement du QA;
- Le cadre théorique du QA est fondé sur des ouvrages traitant de la théorie sociale cognitive qui décrivent le rôle des attributions dans la résistance au stress psychologique;
- Les concepts et le niveau de langue des ouvrages traitant de l'ARP et du programme de développement du QA sont faciles à comprendre;
- Le QA est quelque peu lié aux objectifs de rendement industriels/organisationnels, notamment en ce qui a trait au revenu, aux ventes et au rendement.

Désavantages du QA/ARP :

- Les ouvrages ne prouvent pas que le concept du QA n'est pas mieux représenté par les concepts qui existent déjà (vigueur, optimisme naturel, questionnaire sur le type d'attribution, etc.);
- Le mécanisme par lequel le développement du QA peut générer des changements demeure mal compris;
- La structure du QA qui comporterait quatre facteurs manque d'appuis empiriques que l'on pourrait obtenir par l'analyse exploratoire ou confirmative des facteurs;
- Certains aspects importants entourant la fiabilité et la validité du ARP n'ont pas été décrits et/ou démontrés;
- Les tenants du QA se sont servis de procédures statistiques qui ne sont pas adéquates ni appropriées pour démontrer les propriétés psychométriques de la mesure du quotient. La majorité des recherches relatives au QA ne sont pas suffisamment étayées pour pouvoir tirer des conclusions solides. Les caractéristiques des échantillons, des procédures et des données utilisés lors de ces recherches sont rarement consignées de façon intégrale;
- Plusieurs affirmations qui paraissent dans les ouvrages sur le QA n'ont pas été appuyées du point de vue empirique;
- Peu de recherches relatives au QA sont publiées dans des revues scientifiques dotées d'un comité de lecture;
- Les ouvrages traitant du QA laissent entendre que le développement du QA apporte une grande variété de solutions aux problèmes. Bien que quelques recherches aient été effectuées sur la nature de l'évaluation du QA, une seule étude menée sur le processus de développement et ses résultats est connue. Malheureusement, puisque les concepteurs du test n'ont pas indiqué de coefficient en matière de fiabilité de test-retest, la portée et la stabilité des résultats de ce processus doivent être remises en cause;
- Aucune étude n'a été menée sur l'applicabilité du processus de développement du QA tel qu'il est actuellement à un contexte militaire.

Conclusions : À la lumière de cet examen, la mise en œuvre dans les FC du programme de développement de la résistance à l'adversité, tel qu'il a été conçu dans le présent cadre théorique du QA et les ouvrages traitant de ce sujet, devrait être reportée. Bien que la résilience et le leadership soient des questions valides et importantes au sein des FC, il y a pour l'instant un manque d'ouvrages empiriques à l'appui de la validité du cadre théorique du QA et du programme visant à le développer. Par conséquent, nous ne savons pas pour l'instant si ce programme est en mesure de traiter ces questions adéquatement avec des méthodes qui sont adaptées aux militaires. Toute mise en œuvre de la stratégie actuelle visant à développer le QA des

militaires doit être considérée avec circonspection. On recommande que tout le matériel de formation soit considérablement modifié afin d'être applicable à un contexte militaire et que la mise en œuvre dans les FC de tout programme de développement modifié soit accompagnée d'une évaluation de programme rigoureuse et indépendante.

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Introduction

Major David Cooke convened a meeting to review the potential utility of implementing an adversity training program in the CF (Adversity Response Training meeting, meeting minutes, 22-23 May, 2002). At the meeting, Dr. Paul Stoltz of *Peak Learning Inc.* introduced his Adversity Quotient program [1], suggesting that it may benefit CF personnel in a variety of ways, most particularly in terms of leadership training, as a treatment for those CF personnel who suffer from post-traumatic stress disorder (PTSD), and potentially serving as a proactive method to prevent future PTSD victims. Meeting attendees concluded that the AQ program was deserving of further study. One aspect of that follow-up included a "tough, objective evaluation of the value and potential of AQ training within the CF"(p.4). This report assists in that objective by reviewing the current empirical evidence associated with Adversity Quotient theory and training.

About this report

The goal of the present report is to present a rigorous review of the AQ literature, which is required in order to ascertain the validity of the current AQ conceptual framework and research. This review will assist in the larger goal of identifying the advantages and disadvantages that may be associated with the implementation of the AQ program within the CF. In particular, the present report will:

1. Review stress and coping within the military context;
2. Provide an overview of the AQ conceptual framework.
3. Assess whether the AQ framework builds on the previous theory and research in the area of psychological resiliency, and whether the data indicate that AQ builds on this literature in a substantive manner;
4. Critically review the psychometric properties of the Adversity Response Profile, the measure of individuals' adversity quotient;
5. Critically review examples of AQ research, in particular, published peer-reviewed AQ research;
6. Discuss the applicability of AQ conceptual framework and current training program to a military context; and
7. Provide recommendations to the Department of National Defence (DND) Leadership Institute and training personnel concerning to the proposed implementation of AQ as an adversity training initiative.

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[1] P.G. Stoltz, *Adversity Quotient @ work: Make everyday challenges the key to your success*. (New York: Harper Collins Publisher Inc., 2000).

Note that this report focuses on evaluation of the AQ framework, the Adversity Response Profile (ARP) measure, and the associated AQ research. The report does not represent a critique of the general literature on adversity, or stress and coping. Consequently, our efforts were directed at critically assessing research that has attempted to establish the reliability and validity of the AQ construct. We begin by briefly discussing the issue of psychological stress in the military.

Background

Stress in the military context

CF personnel are often subjected to levels of stress that surpass that which the majority of society experience. With the exception of the present mission in Afghanistan, the majority of the recent CF deployments have primarily focused on peacekeeping. Nonetheless, the experiences of many CF personnel deployed on such missions indicate that levels of occupational stress on peace support operations are often equivalent to wartime missions.[2] For example, CF members deployed on peacekeeping missions may witness the injury or death of military personnel or civilians, may handle bodies and/or body parts, or may be the targets of direct and indirect fire.[3] [4] To further complicate matters, rules of engagement (ROE's) are often inadequate and fail to provide guidance in all possible operational scenarios. This can result in unclear responsibilities (i.e. role ambiguity) and morale conflicts, which can lead to increases in the subjective perceptions of stress.[5] Family concerns during deployment can also create stress for military personnel.[6] As a consequence, CF members must negotiate their emotional and physical responses in order to cope with these stressors.

Prolonged exposure to these stressors and the failure of coping mechanisms may result in a variety of negative psychological stress outcomes.[7] Among the most extreme of these outcomes is post-traumatic stress disorder (PTSD). Individuals suffering from PTSD usually re-experience avoidant and hyper-arousal symptoms associated with the stress-inducing situation.[7] These symptoms may persist throughout the individuals' lives, and result in an increased risk of being diagnosed with other psychological and medical disorders.[8] Another psychological result of stressful military service is learned helplessness, which is characterized by persistent feelings of depression, and the belief that one cannot alter the course of their life's events.[9] Negative life events can be biased to assimilate into the existing

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[2] C. D. Lamerson, and E. K. Kelloway, "Towards a model of peacekeeping stress: Traumatic and contextual influences," *Canadian Psychology*, 37, (1996), 195-204.

[3] Colonel M. D. Capstick, "Command and leadership in other people's wars," in C. McCann and R. A. Pigeau eds., *The human in command: Exploring the modern military experience* (New York: Academic/Plenum Publishers, 2000), 83-91.

[4] General R. A. Dallaire, "Command experiences in Rwanda," in C. McCann and R. A. Pigeau eds., *The human in command: Exploring the modern military experience* (New York: Academic/Plenum Publishers, 2000), 29-50.

[5] M. M. Thompson, and M. A. M. Gignac, *A model of psychological adaptation in peace support operations: An overview*. DRDC Technical Report 2001-050, Toronto, Ontario, Canada, Defense Research and Development Canada.

[6] M. M. Thompson, D. R. McCreary, and L. Pastò, *The Impact of Family Concerns on the Predeployment Well-being of Canadian Forces Personnel*. Manuscript under review (2002).

[7] Thompson and Gignac, 2001

[8] M. J. Friedman, "Diagnosing traumatic stress disorder." *Cognitie Creier Comportament. 5*, (2001), 1-18.

[9] D. S. Hiroto and M. E. Seligman, "Generality of learned helplessness in man." *Journal* of Personality and Social Psychology, 31, (1975), 311-327.

damaging self-schema. This process can create a self-fulfilling prophecy, which, if left unchanged, can lead to permanent psychological and physical problems.[10] The military has a vested interest in addressing the issue of PTSD because of the pervasive negative effects of operational effectiveness. Furthermore, the number of CF members diagnosed as suffering from this disorder has been steadily on the rise following all forms of missions.[11]

The military has designed programs to facilitate the coping of CF members dealing with operational stress, including PTSD. For instance, the CF has instituted five Operational Trauma and Stress Support Centers (OTSSC), located on bases across Canada. At these locals, multidisciplinary teams including psychiatrists, clinical psychologists, social workers, chaplains and/or community mental health nurses, assess and treat a range of problems arising from deployments, which include substance abuse, depression, anxiety, and psychiatric disorders including PTSD. Despite the importance of these initiatives in providing relief to personnel suffering from PTSD, they are largely *ex post facto*; occurring after the fact. That is, CF members must first endure the hardships associated with PTSD, or learned helplessness, before they have access to treatments. These treatments typically involving assessment, intervention, and disposition, are provided in a clinic or hospital setting primarily after referral.[12] As an alternative, it is suggested that a *preventative* method of treatment would be beneficial to the CF.[13]

Preventative programs would attempt to increase the psychological preparation and resilience of CF members before a psychologically demanding military operation begins. One preventative mechanism might include providing individuals with effective methods to increase mental fitness to better cope with negative events. In theory, proactive methods of intervention could reduce the likelihood of CF members suffering from psychological distress in the future, and proportionately reduce the need for reactive treatments.[14] One putative training program is Stoltz's,[15,16] AQ assessment and adjunct training program.

What is Adversity Quotient (AQ)?

Designed for use in an organizational setting, the AQ framework is based on several theories relevant to psychological resiliency and vulnerability, including learned helplessness,[17]

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[10] Hiroto and Seligman, 1975

[11] S. Marin, *"Systemic Treatment of CF Members with PTSD"*, Report to the Minister of National Defence, Ombudsman, National Defence and Canadian Forces (Ottawa: Canada, 2002).

[12] M. M. Thompson and L. Pastò, "Psychological Interventions in Peace Support Operations: Current Practices and Future Challenges." in T. Britt, T & A. B. Adler (Eds.), *The psychology of the peacekeeper: A multinational perspective.* (Westport: CT , Praeger Press, Manuscript in preparation).

[13] Thompson and Pastò.

[14] Thompson and Pastò.

[15] Stoltz, 2000

[16] P. G. Stoltz, *Adversity Quotient: Turning obstacles into opportunities.* (New York: John Wiley & Sons, Inc., 1997).

[17] C. Peterson, S. F. Maier, and M. Seligman, *Learned helplessness: A theory for the*

hardiness,[18] locus of control,[19] and cognitive models of depression.[20] Key principles of attribution theory underlie psychological resilience literature purporting that it is individuals' understanding of the causes of events that are seen as guiding the magnitude of their psychological reactions to stress, and the coping mechanisms they use to alleviate the stress. Thus, particular patterns of attributions are thought to be associated with psychological resilience or vulnerability in the face of stress.[21]

AQ is postulated to be a unifying theory of human behaviour that permits a better understanding of human actions in a multitude of environments. To date, the focus of AQ has been to empower employees, and prepare them to better cope with occupational stress and adversities. Most recently, it has been proposed that the potential benefits associated with this training procedure in the personal and business sectors, could be generalized to the military context in the CF (Cooke, personal communication, July 2, 2002).

The AQ conceptual framework is broadly grounded in three areas of psychology, which include: psychoneuroimmunology (the science of the mind and body interaction), neurophysiology (the science of the brain), and cognitive psychology (the science of the mind and performance interaction). All three of these facets are proposed to equally influence the development of AQ.[22] One's AQ is termed 'hardwired', which would suggest a genetic predisposition. However, Stoltz [23] reports that one can increase their AQ through a structured training procedure, which facilitates the long-term consolidation of the acquired skills.

Characteristics of the AQ conceptual framework

There are three main components of the AQ program. These include the basic conceptual framework of the CORE model, the assessment AQ assessment tool, which also includes a general classification system that can be metaphorically depicted as a mountain, and the LEAD sequence, which is implemented to enhance AQ. Each of these components will be discussed below.

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age of personal control. (London: Oxford University Press, 1993).

[18] S. R. Maddi and S. C. Kobasa, "The development of hardiness." in A. Monat, & R. S. Lazarus, Richard S. (Eds.), *Stress and coping: An anthology* (3rd ed., pp. 245-257). (New York, NY: Columbia University Press, 1991)

[19] H. M. Lefcourt, "Durability and impact of the locus of control construct." *Psychological Bulletin*, 112, (1992), 411-414.

[20] L. Y. Abramson, L. B. Alloy, M. E. Hogan, W. G. Whitehouse, P. Donovan, D. T. Rose, C. Panzarella, and D. Raniere, "Cognitive vulnerability to depression: Theory and evidence." in R. L. Leahy, & E. T. Dowd, eds., *Clinical advances in cognitive psychotherapy: Theory and application*, (New York, NY: Springer Publishing Co., 2002), 75-92.

[21] Thompson and Gignac, 2001

[22] Stoltz, 2000

[23] Stoltz, 2000

The CORE Model

Stoltz has proposed the CORE model to explain the composition of AQ. The **CORE** model represents the four major facets involved in AQ, which include **C**ontrol, **O**wnership, **R**each, and **E**ndurance.

- *Control* – refers to one's perceived level of manipulation over encountered adverse events. High scores on this facet imply an individual that is proactive in their approach towards adverse situations, and the ability to turn adversity into opportunity.[24]

- *Ownership* – refers to the extent to which one holds him/herself responsible for improving their current situation. High scores on this facet imply an individual that will accept responsibility with their actions and learn from the outcomes of the event.[25]

- *Reach* – refers to the extent one perceives good/bad events influencing other areas of their life. Higher scores imply an individual that is likely to control adversity, and view it as a specific and limited event. Those with high scores on the reach facet are individuals that are likely to feel empowered and well prepared to deal with adversity.[26]

- *Endurance* – refers to an individual's perception of the duration of good/bad events. High scores of this facet imply an individual that is likely to view adversity as a temporary event. These individuals are optimistic and have enhanced energy in order to cope with adversity.[27]

According to the AQ framework, these four facets constitute the building blocks for classifying people. This model suggests that people who possess higher levels of these psychological dimensions perform better when they are faced with adversities.

Measurement of AQ

An individuals' AQ level is quantitatively measured through the Adversity Response Profile (ARP), intended to reflect the manner in which an individual automatically or typically responds to challenges in their environment.[28] The results of one's AQ profile are hypothesized to be a precise measure of one's predisposition to respond to all forms, and types of adversity. Stoltz[29] posits that those individuals possessing higher AQ scores will be more successful in their work, and personal lives. Thus, AQ is not simply an indicator of occupational success; it is characterized as a predictor of overall life performance and

[24] Stoltz, 2000
[25] Stoltz, 2000
[26] Stoltz, 2000
[27] Stoltz, 2000
[28] Stoltz, 2000
[29] Stoltz, 2000

adaptation. Therefore, AQ is proposed to predict and influence all facets of human capacity and performance.[30]

The ARP is comprised of 14 scenarios of which only 10 are scored. Each scenario is followed by four questions (one for each component of the CORE model), each scored on a five-point bipolar scale (See Figure 1).

YOU MISS AN IMPORTANT APPOINTMENT.

1)

Circle the number that best represents your response to the four related questions below

a) To what extent can you influence what happen next?	b) How likely are you to make an effort to improve the situation?	c) As a result of this situation:	d) How long will this situation negatively affect You?
5 Completely	1 Not likely at all	1 Everything else is	5 Very briefly
4	2	2 negatively affected	4
3	3	3	3
2	4	4 Nothing else is	2
1 Not at all	5 Very Likely	5 negatively affected	1 A very long time

Figure 1. *Example of question found in the ARP*

Scores on the ARP subscales can range from 10 to 50, and the total composite AQ score can range from 40 to 200.

Once an individual completes the AQ survey (ARP), they are able to calculate four individual CORE facet scores, and an overall AQ composite score. AQ training literature reiterates that the AQ score is "merely a snapshot" of the responses that one is likely to have in the face of adversity. In other words, one's AQ score is dynamic, and may be altered through subsequent training and continuous learning.

Mountain metaphor for classifying: "Climbers", "Campers", and "Quitters"

In addition to numerical values for each of the four CORE dimensions and the composite CORE score, Stoltz[31] has proposed a more general three-tier classification system as an economic vehicle to reflect an individual's coping ability during adversities. The three levels include quitters, campers, and climbers. The system can be viewed as a mountain, with *quitters* at the base, *campers* in the middlemost region of the mountain, and *climbers* as the summit (See Figure2). Each of these functional levels of AQ can be defined as follows:

[30] Stoltz, 2000
[31] Stoltz, 2000

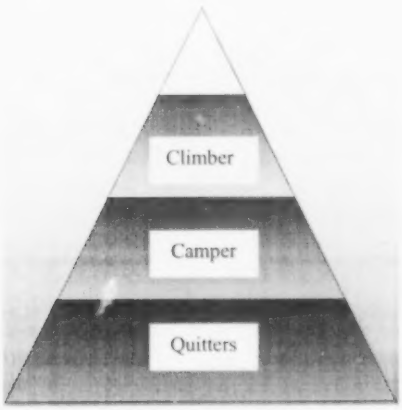

Figure 2. Mountain Metaphor for "Climbers", "Campers", and "Quitters"

- *Climbers* – dedicated to a lifelong ascent, they are relentless in the pursuit of their goals. They think in terms of opportunities and refuse to accept defeat. They are fuelled by challenges and desire to learn from every new encounter.[32]

- *Campers* – get the job done "sufficiently". Generally, they perform their basic functions, at a slower pace than previous displayed and do not strive hard, or sacrifice. They have become tired of the ascent up the personal ladder, and have remained at the same level for some time. They have sacrificed their aspirations and desires for security and stability.

- *Quitters* – overwhelmed by challenges, they have given up on their higher pursuits. They mask or ignore their basic human drives to ascend in life. They are often resentful of those around them and show signs of depression.[33]

This classification system is suggested to be applicable to all organizations. However, Stoltz[34] also states that it should be used with caution. The system is meant only as a guide and must not be utilized to formulate important decisions.

AQ training

In order to enact change in an individual's AQ, Stoltz [35] has proposed the use of the "LEAD Sequence". The **LEAD** Sequence is a four-component hierarchical process. The steps include **L**istening to one's response to adversity to bring the situation to forefront, **E**stablishing accountability to eliminate learned helplessness and initiate action, **A**nalyzing the evidence to assess only the relevant information, and **D**oing something, or pinpointing the specific course of action.[36]

This process is used to help one's self, and others to improve AQ. The LEAD Sequence was developed to "immunize" people against depression and learned helplessness. Stoltz[37] emphasizes the fact that once an individual has been trained to increase their AQ through the LEAD sequence, they are empowered with the abilities to train others as well. This process has the potential to enact a large-scale change of coping abilities within an organization.

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[32] Stoltz, 2000
[33] Stoltz, 2000
[34] Stoltz, 2000
[35] Stoltz, 2000
[36] Stoltz, 2000
[37] Stoltz, 2000

To date, Stoltz reports that the AQ's of approximately 100,000 individuals have been measured, and that AQ training has been provided to dozens of organizations.

It has been proposed that, among its possible applications, AQ *may* be used as a predictor of job performance. Preliminary studies performed by Peaked Learning Inc., available on the following websites,

http://www.peaklearning.com/aq/measuringaq/ARP_Performance_Studies.htm

http://www.peaklearning.com/aq/measuringaq/ARP_Reliability_Validity.htm,

indicate that AQ has been used in organizations to predict entrepreneurial income, sales, and leadership (see Appendix A for more details). According to the client listings, the US Air Force and the US Department of Defense have also utilized AQ. However, the details of these military applications of the AQ program are not specified, nor were they made available for this review.

AQ revisited: A second look at empirical and psychometric properties

Review of the empirical AQ literature

This section focuses on evaluating the empirical foundations of the AQ and the current data examining aspects of AQ and the ARP measure. Initially, an emphasis was placed on examining experimental research published in peer-reviewed journals (e.g., Journal of Personality and Social Psychology, Journal of Applied Psychology, Organizational Behavior and Human Decision Processes, etc.). The goal of evaluating the peer-reviewed journals was to assess the empirical appraisals of the AQ by independent researchers. Additionally, we sought to provide a comprehensive balanced assessment beyond the studies conducted by the test and training developers at *Peak Learning Inc.* or those researchers under contract to the test developers.

We began with a literature search of commonly accessed literature databases including *Applied Science and Technology Abstracts, EconLit, WorldCat, Proceedings, Papers First, SocAbs*, and *PsychInfo*. There were no matches for Adversity Quotient in peer-reviewed journals. However there was one proceedings paper, and two books by Stolz.[38,39] We also found one proceedings paper,[40] and a magazine article on AQ by Welles[41]. We were also provided with an additional report by Markman.[42] Overall, our review revealed that there have been few external empirical tests of AQ or the ARP measure. In the next section, we examine the conceptual, statistical, and psychometric issues related to AQ based on the literature available, which primarily is associated with the *Peak Learning Inc.* website and the work of Markman.

Conceptual

AQ has been marketed as a highly robust predictor of resilience, performance-under-pressure, problem solving, mental clarity, stamina, and tenacity.[43] The AQ training procedure has been developed to improve "mental toughness" or response ability, thus improving individuals'

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[38] Stoltz, 1997
[39] Stoltz, 2000
[40] G. D. Markman, "Adversity Quotient: The role of personal bounce-back ability in new venture formation," in D. Deschoolmeester eds., Vlerick Leuven Gent Management School. (2002a).
[41] E. O. Welles, "Sure, IQ is important, but maybe it's really the Adversity quotient (AQ), of an individual or an organization that determines entrepreneurial success," *Inc.* 22, (2000), 43-49.
[42] G. D. Markman, "Adversity Quotient: Entrepreneurial success by determination." Paper presented at the European small business seminar. (Ghent, Belgium, 2002).
[43] Stoltz, 2000

resilience, performance-under-pressure, problem solving, mental clarity, stamina, and tenacity.

Peak Learning Inc. materials assert that AQ is grounded in more than 30 years of research. However, it is learned helplessness, hardiness, dispositional optimism, and the locus of control research that have a long and well-documented research legacy, rather than AQ. The validity of AQ and its training has yet to be empirically established.

It is beyond the scope of this paper to review all of the psychological resiliency constructs. However, it is important to note that there is a wealth of research suggesting that particular patterns of attributions are associated with a variety of emotional and performance outcomes.[44] In particular, the research suggests that individuals who make internal, stable and/or global attributions of negative life events have a greater propensity to experiencing depressed affect,[45] including Post-Traumatic Stress Disorder,[46] poorer health outcomes,[47 48] and to perform poorly on subsequent tasks,[49 50] relative to individuals who make external, unstable (i.e., changeable), and more localized attributions. There have been some studies that have suggested that therapy directed toward modifying attributional patterns are associated with better therapeutic outcomes, at least among depressed individuals.[51 52 53]. Note however, the research findings in this area have not provided unanimous support for the relationships between specific attributional patterns and negative outcomes.[54 55]Overall, the AQ framework

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[44] C. Peterson, and M. E. Seligman, "Casual explanations as a risk factor for depression: Theory and evidence." *Psychological Review,* 91 (1984), 347-374.

[45] H. Cheng and A. Furnham, "Attributional style and personality as predictors of happiness and mental health." *Journal of Happiness Studies,* 2, (2001), 307-327.

[46] M. Mikulincer, and Z. Solomon, "Attributional style and combat-related posttraumatic stress disorder." *Journal of Abnormal Psychology*, 97, (1988), 308-313.

[47] J. Dykema, K. Bergbower, and C. Peterson, "Pessimistic explanatory style, stress, and illness". *Journal of Social and Clinical Psychology,* 14 (1995), 357-371.

[48] F. X. Brennan and C. J. Charnetski, "Explanatory style and Immunoglobin A (IgA)." *Integrative Physiological and Behavioural Science*, 35, (2000), 251-255.

[49] M. Mikulincer, "Joint influence of prior beliefs and current situational information on stable and unstable attributions." *Journal of Social Psychology,* 130, (1990), 739-753.

[50] M. E. Seligman, S. Nolen-Hoeksema, N. Thorton, and K. M. Thorton, "Explanatory style as a mechanism of disappointing athletic performance." *Psychological Science,* 1, (1990), 143-146.

[51] A. Green-Emrich and E. M. Altmaier, "Attribution retraining as a structured group counseling intervention." *Journal of Counseling and Development,* 69, (1991), 351-355.

[52] J. G. Johnson, A. Crofton, and S. B. Feinstein, "Enhancing attributional style and positive life events predict increased hopefulness among depressed inpatients." *Motivation and Behaviour,* 20, (1996), 285-297.

[53] M. E. Seligman, C. Castellon, J. Cacciola, P. Schulman, L. Luborsky, M. Ollove, and R. Downing, "Explanatory style change during cognitive therapy for unipolar depression." *Journal of Abnormal Psychology*, 97, (1988), 13-18.

[54] D. M. Houston, "Gloomy but smarter: The academic consequences of attributional style." *British Journal of Social Psychology*, 33, (1994), 433-441.

incorporates seminal psychological theories and research associated with psychological resiliency and vulnerability. Furthermore, the AQ manual presents concepts associated with psychological resiliency training in a readable, and accessible manner.

Despite its conceptual pedigree, the AQ literature lacks a clear theoretical discussion of the mechanisms responsible for "response ability" improvement when facing adversity. Based on the information available in AQ sources, it is difficult to determine the mechanisms by which the target variable(s) are affected by the training. For example, it may be argued that the training could impact self-esteem, self-efficacy, optimism, or motivation. However, these processes have not been articulated.

Attributional dimensions

The majority of the literature and empirical data pertaining to psychological resiliency/vulnerability summarized above were founded upon individuals' responses to the Attributional Style Questionnaire (ASQ).[56] The ASQ is comprised of three dimensions that include: Internality, Stability, and Globality. The format of the ASQ consists of 12 life events, comprised of an equal representation of both positive and negative events. The respondents' goal is to generate a reason to explain why the event occurred, and rate the antecedents of the event along several 7-point Likert-type scales assessing the three dimensions.[57] Although there has been some debate concerning the ASQ's overall reliability,[58] it remains the industry standard with respect to assessing attribution style.[59]

It appears that the ARP is based upon the ASQ.[60] The general approach, and specific response format clearly mirror the ASQ. Yet we could find no discussion of the ASQ as the basis of the ARP. In contrast to the three dimensions assessed in the ASQ, the ARP is structured with four factors. The AQ's proposed factor structure purports to ostensibly measure the separate attributional dimensions of: Control, Ownership, Reach and Endurance. Thus, the factor structure of the AQ could be seen as representing an extension of traditional attribution theories. However, no empirical rationale was reported to justify the addition of the fourth dimension. It is possible that the internality dimension of the ASQ has been separated into the dimensions of ownership and control within the AQ. If this is the case, Stoltz[61] should provide an empirical rationale to warrant this distinction and discuss how the structure of the ARP improves upon the ASQ with regards to assessing attributions.

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[55] J. M. Satterfield, J. Monahan, and M. E. Seligman, "Law school performance predicted by explanatory style." *Behavioural Sciences and the Law,* 15, (1997), 95-105.
[56] C. Peterson, A. Semmel, C. von Baeyer, L. Y. Abramson, G. I. Metalsky, and M. E. Seligman, "The Attributional Style Questionnaire." *Cognitive Therapy and Research,* 6, (1982), 287-300.
[57] C. Peterson et al., 1982
[58] P. D. Sweeny, K. Anderson, and S. Bailey, "Attributional style in depression: A meta-analytic review." *Journal of Personality and Social Psychology,* 50, (1986), 974-991.
[59] C. Peterson, and M. E. Seligman, "Casual explanations as a risk factor for depression: Theory and evidence." *Psychological Review,* 91, (1984), 347-374.
[60] C. Peterson et al., 1982
[61] Stoltz, 2000.

Psychometric issues

To adequately develop/implement a novel measure, a responsible scientist must be able to provide a cogent rational for constructing the test for a specified purpose, and for creating the test over already available assessment tools.[62] In other words, for a measure to be recognized sufficient for wide-scale production and use, the adequacy of the psychometric properties (reliability, validity, generalizability, etc.) must be established.

Scenario Generation

There is no empirical rationale provided concerning how the test developers constructed, or selected the scenarios presented in the ARP assessment tool. The test developers have not reported whether they used subject matter experts (SME) or a "common sense" approach to generate a number of potential scenarios from which a final number were chosen.[63] This information would be beneficial in determining the applicability of the scenarios to other populations. These procedures should be explained to strengthen the argument for utilizing the AQ measure and training.

Each of the four CORE dimensions assessed with respect to each scenario, appear to have high face validity. That is, control, ownership, reach and endurance are all well represented in the four questions related to each adversity scenario. Nonetheless, requisite statistical analyses' concerning the development of the subscales is lacking. For instance, the ARP technical supplement reports that if the inter-correlations between subscales are of less magnitude than the lowest internal reliability coefficient, this can be viewed as support for the proposed factor structure. Although this statistical procedure provides moderate support for the four-factor structure of the AQ, it is not the most effective method for assessing the underlying putative factors of a construct. The authors should at the very least report exploratory factor analyses, and preferably confirmatory factor analyses, to show that the items selected for each subscale actually group together. Factor analysis determines the correlations between test items and latent factors.[64] It appears the AQ test developers have hypothesized that the sub-factors are uncorrelated. Hence, an oblique factor analysis should be conducted. This would provide a clearer picture of the amount of variance that is accounted for by each of the subscales. While alpha reliability estimates and inter-factor correlations are indications of factorial validity, exploratory factor analysis or confirmatory factor analysis should be performed to better substantiate the factor structure of the ARP.

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[62] S. Messick, "Evidence and ethics in the evaluation of tests." *Educational Researcher*, 10, (1981), 9-20.

[63] V. Catano, S. F. Cronshaw, W. H. Wiesner, R. D. Hackett, and L. L. Methot, *Recruitment and selection in Canada*. (Scarborough, Ontario: Nelson Thomson Learning, 2001).

[64] L. Crocker, and J. Algina, *Introduction to classical & modern test theory*. (New York: Harcourt College Publishers, 1986).

Reliability of the ARP

Cronbach's alpha was calculated to assess the reliability of the ARP. This technique assesses the consistency among the items within a scale, during a single test administration. Scores on the ARP subscales were found to have coefficient alpha values ranging from $r = 0.77$ to $r = 0.86$. The overall AQ score has a coefficient alpha of $r = 0.86$. These are acceptable to good levels of internal consistency.

However, it should be noted that the *test-retest reliability*, which is the degree of stability in test scores over time, has not been evaluated. Stoltz,[65] argued that internal consistency is the most meaningful way of assessing AQ reliability because life experiences may cause people's AQ to change. While this may be so, most test-retest reliability estimates are done over only a 4 week period -- if there is no AQ training taking place, and if no major life events occur, then the correlation between T1 and T2 would be equivalent to the test-retest estimates for similar constructs (e.g., optimism). Indeed test-retest reliability would seem to be an absolute pre-requisite for these researchers given their assertion that ARP profiles will improve with training. We need to determine that any increases are due to the training program and would not have occurred naturally otherwise. While Cronbach's alphas are one necessary test of scale consistency, the stability of self-ratings also need to be assessed over the short-term. In addition, corrected item-total correlations would show the degree to which each item contributes to the scale or subscale total. While the authors do not want to put their (use-for-pay) questionnaire online, they could report the resulting statistics (e.g., "corrected item-total correlations for the Control scale ranged from..."). These statistical procedures are required to demonstrate the reliability of the measure.

Normative results

The *Peak Learning Inc.* website states that AQ data have been collected on over 100,000 people, and in the Reliability and Validity section of the website they report that norms are available on a diverse sample of 2,414 employees and students. However, the reliability and validity analyses the authors report were based on a smaller sample of 837 cases. It is unclear how those cases were selected and whether it was done on a random basis. The decrease in the size of the norm group is quite dramatic. This reduction in the total sample size could have greatly biased the final results.

The authors present descriptive statistics (AQ score and 4 subscales) and percentile ranks for the AQ scores. We believe the test developers are making the assumption that the AQ and its subscales represent trait-based personality characteristics that are amenable to training. If so, the authors also need to demonstrate that the AQ scale and subscales are normally distributed, as all personality measures (as opposed to, for example, clinical measures) should be. For example, measures of skewness and kurtosis could be added.

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[65] P. G. Stoltz, *Technical supplement to Adversity Response Profile (ARP™)*. (San Luis Obispo, CA: *Peak Learning Inc.*, 2001).

The construct validity of the ARP

In general, construct validity studies establish whether scale scores effectively measure the construct they were developed to assess. In the case of the AQ, validity studies should demonstrate the usefulness of the ARP scale in predicting meaningful resiliency related outcomes and the effectiveness of AQ training. Validity of a novel measure is characteristically established with several criteria.[66] First, the construct must be operationally defined. In this respect, one deficiency of the validity work concerning the AQ is that an operational definition for the underlying construct of adversity was largely omitted from the AQ literature. For example, while the literature states that an individual is confronted with up to 25 adversities per day, there is no mention of what typifies these adversities. Consequently, in order to clarify the conceptual model of AQ, an operational definition of adversity should be provided.

A second criterion establishing the validity of a measure concerns the statements of putative relationships with other existing psychological constructs, and real world criteria; termed convergent and discriminant validity. Test developers must provide a clear theoretical rationale to explain the inclusion of criterion validity measures into the test development process.

Convergent validity

Convergent validity is demonstrated through correlations between measures of the same construct using different measurement methods.[67] In other words, it is desirable to attain a high correlation between different instruments measuring the same construct.

While the authors mention convergent validity on their website, they present only minimal data exploring this aspect of the AQ's validity in this regard. For instance, one study, reports a relation between self-reported AQ scores and managers ratings of productivity. However, there are few details provided pertaining to the properties of the productivity rating selected, including its psychometric properties, making the results of this study difficult to replicate. Although a statistically significant correlation between AQ scores manager rating of productivity was reported, the magnitude of these correlations are actually low (or, according to Cohen,[68] low-moderate), ranging from .08 (ns) to .29. That is, AQ scores explained approximately 8% of the variance in manager ratings of productivity.

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[66] L. Crocker and J. Algina, 1986

[67] L. Crocker and J. Algina, 1986

[68] J. Cohen, *Statistical power analysis for the behavioural sciences* (2nd ed.). (Hillside, N.J.: Erlbaum, 1988).

Discriminant validity

Discriminant validity establishes the distinctiveness of a new measure. It is typically displayed as a correlation coefficient between multiple measures or constructs believed to be unrelated to the measure under development. The values that are attained through these discriminant validity procedures should be lower than the obtained internal reliability, and convergent validity correlation coefficients. The underlying theoretical rationale is to demonstrate that the novel construct or scale explains unique variance, otherwise not accounted for by any other psychological constructs or measures.

ARP subscales inter-correlations are presented, under the assumption that the four scales should not be highly intercorrelated. Although this does provide some evidence of discriminant validity, there must be a clear theoretical rationale to justify the dissimilarity between the existing utilized measures. If a low correlation coefficient is obtained between the novel measure and an established assessment tool, it is support for the argument that the novel measure is assessing a construct unrelated to the existing construct. For example, it is common practice to show that a new measure is unrelated to social desirability.

Importantly, tests of discriminant validity should also demonstrate that ARP provides some 'value-added' to pre-existing measures. Thus, discriminant validation efforts should also include a number of scales measuring pre-existing constructs to further demonstrate that the ARP instrument is measuring a novel psychological construct. Thus, in order to properly assess discriminant validity, Stoltz should use existing measures of the dimensions that the AQ construct purports to assess: e.g., hardiness, optimistic bias, and locus of control. These kinds of rigorous tests would lend greater support to the discriminant capabilities of the ARP measure. To date, it does not appear that these tests have been conducted.

Predictive or criterion validity

The *Peak Learning Inc.* website summarizes general findings from a series of performance studies, which give an indication of the levels of predictive or criterion validity (though many psychometric researchers do not feel that perfect predictive validity can ever be achieved.[69] Unfortunately, the descriptions of the data analyses and findings presented on the *Peak Learning Inc.* website are unclear and the actual statistics are missing, making the evaluation of these studies difficult.

There was one AQ study reported on the *Peak Learning Inc.* website in which the effects of training were examined. According to the results of this study, the average AQ score increased from 132 at baseline, to 172 upon completion

[69] J. C. Nunnally, and I. H. Bernstein. *Psychometric theory*. (New York: McGraw-Hill, 1994).

of a second round of AQ training 6 months after the initial intervention. While this may indicate a training effect, the magnitude of the effect is confounded by two issues: (1) there has been no test-retest reliability research reported, so we do not know what the natural variability is in AQ over time; and (2) there was no assessment of AQ at 6 months before the second training session. Each of these issues are rooted in the concerns identified previously regarding the lack of assessment of the stability of AQ over time (as measured by ARP) and the long-term stability/retention of AQ training.

There was one external study evaluating the AQ reported on the *Peak Learning Inc.* website, written by Gideon Markman from Rensselaer Polytechnic Institute in N.Y. State. In his study on innovators (i.e., inventors), he reported data showing that there were no correlations between the number of patents developed and AQ. Furthermore, only small correlations (.08-.23) between AQ and income were found. This is not particularly strong support for the predictive validity of the ARP.

We were able to obtain full reports of two studies involving AQ concepts and the ARP measure.[70] [71] The first explores relationship between AQ/ARP and the earnings of entrepreneurs. Although Markman[72] presents average income scores and differences in earnings of the top and bottom 20th percentiles of AQ scorers, there do not appear to be any tests of significance performed on the data. Moreover, the AQ framework would suggest that technical entrepreneurs should be higher earners than technical non-entrepreneurs. Yet, the data does not support this hypothesis displaying that top entrepreneurs earn $147,000 and top non-entrepreneurs earn $157,000, at least on the control dimension of AQ.

In a second study, Markman[73] used a structural equation model to explore the relation between Entrepreneurship and the four dimensions of AQ (i.e., Control, Ownership, Reach, and Endurance), controlling for education, age, annual income, and innovation experience. There is some question as to whether the data were properly analyzed (e.g., adequate estimation method), as there is not enough detail on the specifics of the model (e.g., relationships among endogenous variables). Importantly, the results suggest that only the Control and Ownership dimensions are actually implicated in entrepreneurship, while the Reach and Endurance dimensions do not seem to be significantly related to it. These findings further beg the question of whether the entire AQ scale is necessary. Additionally, Markman[74] suggests

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[70] G. D. Markman, "Adversity Quotient: The role of personal bounce-back ability in new venture formation." In D. Deschoolmeester (Eds.), *Vlerick Leuven Gent Management School*, (2002a).

[71] G. D. Markman, *Adversity Quotient: Entrepreneurial success by determination*. Paper presented at the European small business seminar, Ghent, Belgium, (2002b).

[72] Markham, 2002a

[73] Markham, 2002b

[74] Markham, 2002b

that the results of this study address issues of trainability, yet, as training was never assessed here, it is not clear how these results could be used to substantiate the trainability aspect of AQ.

Taken together, the current empirical evidence does not strongly support the validity of the ARP with respect to the selected occupational/organizational indices.

The applicability of AQ training to military contexts

A final question concerns the applicability of AQ training to military contexts. According to the client listings, AQ has also been utilized by the US Department of Defense, specifically within the U.S. Air Force. However, details regarding these studies remain unclear. To date, we have not received any information of the particulars of this research.

Indeed, similar questions exist with respect to how relevant the majority of examples used in the current AQ program would be to military personnel. With respect to military leadership training, questions of whether individuals who make good entrepreneurs would necessarily make good military leaders. A "good" military leader would entail placing the needs of subordinate personnel before their individual needs. This seems to oppose many of the central qualities of entrepreneurs. Thus, it could be argued that the very qualities assessed by the AQ, which make for good entrepreneurs might not make for good military leaders.

Summary and recommendations

This report reviewed and evaluated the AQ conceptual framework, and the psychometric properties of the ARP measure, as well as the currently available empirical literature testing AQ. A number of conceptual, methodological and psychometrical issues associated with AQ were raised. These issues fall into three general categories: (1) the literature on the AQ (2) the research strategy to validate the AQ, and (3) the use of the AQ in the CF. We discuss each of these issues and present recommendations concerning each issue below.

The literature on the AQ

Thus far, only brief summaries of the validity work are available on the AQ website and accompanying literature. Unfortunately, these do not provide sufficient detail to facilitate a rigorous empirical review. To date, there is very little research concerning AQ reported in peer-reviewed empirical sources. As a consequence, the empirical validity of the construct still needs to be evaluated by the scientific community. We suggest that:

- Validation of the AQ construct requires further evaluation by the scientific community through rigorous research.
- Empirical studies should be conducted by researchers independent from *Peak Learning Inc.*, to demonstrate that AQ results are replicable. The results of this research should be published in peer-reviewed journals (i.e., Journal of Personality and Social Psychology, Journal of Applied Psychology, Organizational Behaviour and Human Decision Processes, etc.).

- *Peak Learning Inc.* should release the complete results of their ARP and the AQ training validation studies to the scientific community for closer scrutiny (e.g., peer-reviewed journals).

Research strategies

As indicated throughout the report, there are numerous issues with respect to the current research strategies used to validate the AQ framework. A number of these issues are related to the lack of information provided by *Peak Learning Inc.* on the procedures used to validate the AQ construct, the ARP scale, and the related training program. Consequently, as a result of the limited information available at this time, we are recommending the following:

- A solid theoretical rationale should be provided to explain the selection of the 14 items included in the ARP scale.
- Factor analysis and structural analysis should be conducted in order to empirically define and confirm the factor structure of the AQ construct.
- The test-retest reliability of the ARP instrument needs to be established in order to demonstrate the effectiveness of AQ training.
- The Multitrait-Multimethod Matrix technique should be used to appropriately demonstrate the discriminant and convergent validity of the AQ construct with other existing constructs.
- Additional studies with large samples should be conducted with civilian and military populations in order to determine the generalizability of the results.
- The majority of the studies on AQ have been conducted in natural settings. Although this can provide useful information, research with more experimental control must complement the existing work. Such a strategy will permit greater control of potential extraneous or confounding variables.
- Longitudinal studies must be performed to assess the predictive validity of the ARP. In particular, the long-term effectiveness of AQ training must be demonstrated.

Applicability of the AQ and ARP to the CF

Considering the high risk for CF personnel to suffer from PTSD and other forms of operational stress, the potential of implementing a proactive psychological resiliency training program is a highly beneficial alternative to reduce post-stress therapy and treatments. However, at this point it is not clear how the present AQ training program might be modified to meet the needs of the CF. Military personnel deserve the best in care and training. Thus, any training program adopted must be theoretically sound, well validated, and appropriate for military personnel. Any proposed treatment program of this nature should be objectively evaluated in terms of its potential effectiveness, and be accompanied by an assessment of the potential advantages and disadvantages.

AQ/ARP advantages:

- AQ claims to assess an individual's ability to respond to all adversities.
- AQ is hypothesized to be amenable to change, specifically, improvement is altered via implementing the LEAD sequence in AQ training.
- The AQ framework integrates psychological theory and literature in the manner in which particular patterns of attributions may leave individuals more or less vulnerable to negative psychological outcomes.
- The level of language of the ARP and the AQ training program literature makes it accessible and easily understandable.
- AQ, as captured by the ARP measure, shows some, albeit limited, association with industrial/organizational performance outcomes including: income, sales, and performance.

AQ/ARP disadvantages:

- It has not been demonstrated if the AQ construct is better represented through already existing constructs (e.g., hardiness, dispositional optimism, attribution style, etc.).
- The AQ hypothesized four-factor structure lacks empirical support via exploratory or confirmatory factor analyses.
- Important aspects of the reliability and validity of the ARP have not been demonstrated.
- The mechanism(s) through which AQ training may enact change remains unclear.
- AQ proponents have utilized statistical procedures to demonstrate the measure's psychometric properties, which are inadequate/inappropriate.
- Much of the current AQ research neglects to report important aspects of the samples, and procedures implemented. Results are rarely reported in sufficient detail.
- Several of the claims listed in the AQ literature have not been empirically substantiated. For instance, AQ studies should demonstrate that AQ training affects important life outcomes, other than those solely related with entrepreneurship. I particular, those outcomes that would be relevant to military personnel should be explicitly stated.
- The AQ literature suggests that a wide variety of solutions are obtainable through AQ training, in particular increasing the AQ of employees. While there is some evidence of research into the nature of AQ assessment (in terms of the basic reliability and validity of the AQ measure), there is only one reported study of training and its outcomes. Unfortunately, because the authors did not report any test-retest reliability coefficients, the magnitude and stability of the training outcomes need to be questioned.
- There is a lack of AQ research published in peer-reviewed scientific journals.

In conclusion, in light of the issues raised in this report, we suggest that the application of a resilience training program, as defined and conceptualized under present AQ theory and training, be postponed with the CF. Although psychological resiliency and leadership are important and valid concerns within the CF, it is unclear if the AQ current training program can adequately address these issues in ways that are appropriate for military personnel.

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Adversity Response Training Meeting Minutes, 22-23 May, 2002. Canadian Forces College, Toronto, Ontario.

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Annex A: Selected annotated bibliography of AQ performance studies

The following section is reviewing the performance studies provided in the AQ technical supplement package (Technical Supplement of AQ, 2000). These studies were reviewed as presented and criticized based on the information available.

AQ and performance/promotability at *Deloitte & Touche (D&T), LLP.*

D&T desired to assess the ability of the AQ to predict performance and promotability in 124 new hires in the Great Lakes region. The study had three goals (1) assess the relationship between AQ and performance within the firm; (2) use the AQ training to improve the performance and retention of the new hires; (3) determine if those with higher AQ scores would be promoted faster than those with lower scores. The results suggest that AQ positively related to performance and promotion. Those individuals with higher AQ scores tended to outperformed and were more likely to be promoted than their lower AQ co-workers. The findings were found to be statistically significant. However, there were a number of problems with the study. There was no demographic information presented regarding the composition of the sample. There could have been a number of pre-existing differences that led to the differences between the levels of AQ performance. With regards to the training, there was no information provided concerning the baseline levels of performance, or the amount of change that occurred following the completion of AQ training. Thus, this does not allow for comparing the levels of improvement that might have been enacted by the AQ training. There was a lack of information concerning the performance measure utilized and no data concerning its reliability or validity were reported. Furthermore, a description of how promotion was allocated was also absent from the study. The major limitation of the research as reported in the AQ Performance Study manual, is the lack of details provided concerning the procedure that was implemented for the entire study. This leads to a cautious interpretation of the resulting data.A.2 AQ and sales performance at Diversity Collection Services (DCS), Inc.

The purpose of the present study was to determine the extent to which AQ predicted performance in 450 employees at three different locations in the U.S. Performance was measured through the collection of percentage/cents on the dollar collected per contract. DCS created a performance rating system, which had a range of one (top performers) to four (lowest performers), with each point of the scale explicitly defined. Results showed that AQ predicted performance at DCS, with the top performers having statistically significant higher AQ scores than the low performers. However, there are number of limitations of the study. There was no demographic information provided concerning the participants in the study, nor was there mention of how the regional branches of DCS might differ. There was no reporting of any psychometric assessment (e.g. reliability or validity) of the performance measure. Also, descriptive statistics concerning the scale results were not reported. If one assesses the results obtained in this study, with the knowledge that the standard deviation of the AQ is 15.70, the scores that differentiate between the high, medium, and low performance groups

could theoretically all come from the same group. Thus, any proposed differences between the groups could be purely coincidental. A final limitation of the reporting of this study is that there is no procedural information provided. Hence, the results must be interpreted with great caution.

AQ and sales performance at *SBC Telecommunications*

SBC assessed the relationship of AQ and sales performance. AQ was assessed in three performance categories (1) % Topline; (2) % of Quota; and (3) % of Net. Results indicate that those that scored in the top half of the AQ scores outperformed those with AQ scores in the lower half in all three categories by at least 106%. However, there were no definitions provided for each of the performance, nor was any indication given how these areas were assessed. A total number of participants was not provided, and there was also an associated lack of demographic and psychometric information.

AQ and change/leadership at *MP Water Resources*

The purpose of the present study was to determine the long-term effectiveness of AQ training in 60 company leaders. The *top* leaders had their AQ's measured, and then were given a one and a half day training course, after which point their AQ's were measured again. A second training session, which lasted only one half day, was conducted six months after the initial session. Supervisors also provided subjective performance measures of the participants, on a scale of 1-10 (10 indicating high performers). The results indicate that AQ correlates with the subjective measures of performance. The fact that only the 60 *top* performers were chosen to participate imposes the problem of range restriction on the obtained data. There was no demographic information provided, nor was information concerning the differences between regional offices provided. Information concerning the training procedure and content was lacking. Statistical procedures assessing the degree of correlation between AQ and performance were not presented. A psychometric evaluation of the performance measure was not conducted. There are also issues pertaining to the performance measure. It is not known whether the supervisor performance rating was conducted at each training session, or whether it was a single assessment. That fact that the measure is subjective could also bias the results. These experimental limitations greatly limit the integrity, and generalizability of the data.

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14. ABSTRACT

(U) This report reviews the theory of the Adversity Quotient (AQ), and the associated training procedure developed by Stoltz (1997; 2000). This report covers three general areas. First, we present an overview of the AQ conceptual framework and training program. Second, the psychometric properties of the AQ are reviewed to determine if the proposed conceptual framework is supported quantitatively. Third, we critically review the current empirical literature associated with AQ. We also discuss the applicability of the AQ training procedure to the CF, in particular, the utility of current AQ training as a treatment for post-traumatic stress disorder (PTSD), learned helplessness, and to augment leadership training in a military context. Finally, we provide recommendations for the CF with regards to the proposed implementation of the AQ training as a proactive intervention. A critical review of the AQ and associated literature revealed that AQ is based on a number of sound theories implicated in psychological resiliency. However, while the AQ framework and training program may possess face validity in an industrial/organizational context, to date there is lack of empirical literature substantiating both the validity of the AQ framework and the training program in important ways. Thus, the implementation of current AQ training into a military environment must be approached with great prudence. It is recommended that all training materials require significant modification to be applicable to a military context, and that any implementation of a modified training program in the CF be accompanied by rigorous and independent program evaluation.

(U) Ce rapport examine la théorie du quotient d'adversité (QA) et le processus visant à développer ce dernier qui ont été mis au point par Stoltz (1997, 2000). Il comporte trois sections générales. Premièrement, nous présentons un aperçu du cadre théorique et du programme de développement du QA. Deuxièmement, nous examinons les propriétés psychométriques du QA dans le but de déterminer si le cadre théorique proposé est appuyé par des données quantitatives. Troisièmement, nous faisons la critique d'ouvrages empiriques traitant du QA. Nous discutons aussi de l'applicabilité du processus de développement du QA dans les FC et, en particulier, de son utilité dans sa forme actuelle pour traiter le syndrome de stress post-traumatique (SSPT) et l'incapacité apprise, ainsi qu'augmenter le leadership dans les Forces canadiennes. Enfin, nous faisons des recommandations aux FC sur la mise en œuvre du processus de développement du QA comme mesure proactive. Un examen critique des ouvrages liés au QA et à d'autres sujets connexes a montré que le concept du QA est fondé sur un certain nombre de théories sensées sur la résilience. Cependant, même si le cadre théorique et le programme de développement du QA pourraient être valides dans un contexte industriel/organisationnel, on constate pour l'instant l'absence d'ouvrages empiriques qui en soutiennent de façon importante la validité. Ainsi, la mise en œuvre du processus actuel de développement du QA des militaires doit être considérée avec circonspection. On recommande que tout le matériel de formation soit considérablement modifié afin d'être applicable à un contexte militaire et que la mise en œuvre dans les FC de tout programme de développement modifié soit accompagnée d'une évaluation de programme rigoureuse et indépendante

15. KEYWORDS, DESCRIPTORS or IDENTIFIERS

(U) Adversity Quotient; empirical review